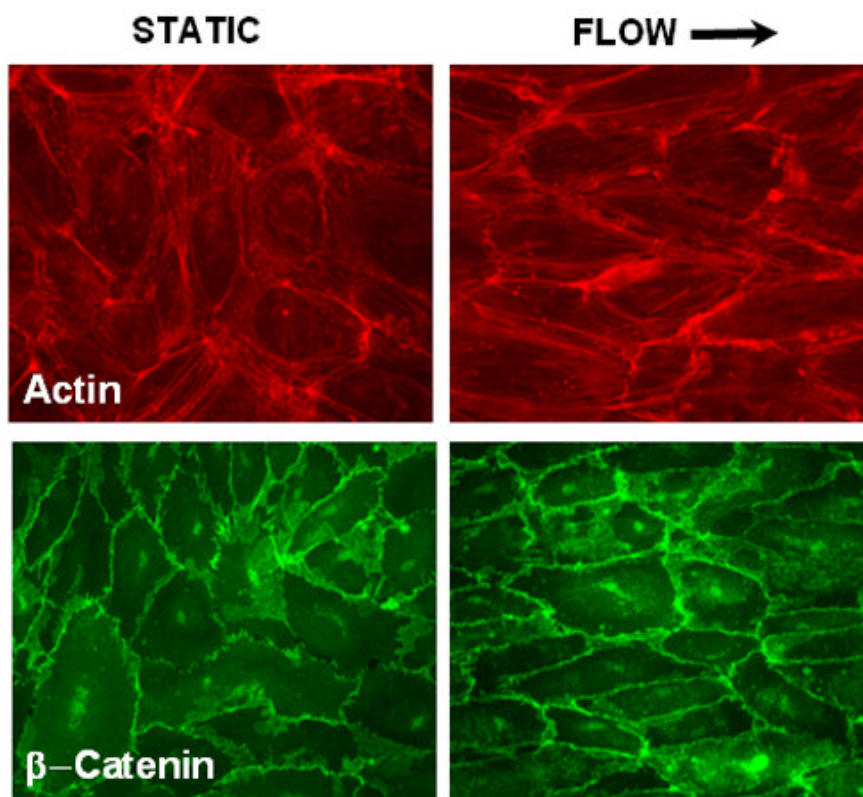


# Neutrons provide new insights into human cell behavior

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Scientists have studied cells since their discovery by Robert Hook in 1665. Understanding their structure, function and even chemical reactions individually and collectively has huge implications for advancements in medical knowledge and the development of new treatments. Lab researchers, along with those of other institutions, are breaking new ground in cellular biology through the application of neutron-scattering techniques.

“Neutrons have advantages over other imaging probes, such as x-rays, because they don’t kill the cells, can reach deeply buried structures and allow us to see layers of proteins, lipid membranes and other cell components in new ways with high resolution,” said Jarek Majewski with the Lujan Center at the Los Alamos Neutron Science Center.

Applying neutron scattering to cell research is a new concept because it requires special collaborations between biologists and physicists and only a few facilities in the

world are capable of performing this work (three are in the United States, including Los Alamos).

Initially, the approach is to better understand what happens to the cells immediately inside human veins (called endothelial cells) as they encounter the physical forces of blood flow across their surfaces.

Already the research is revealing that under such stresses the cells appear to work together to flatten and thereby reduce the friction from the fluid moving across them. This, in turn, helps them stay in place so they can fulfill their functions including as a barrier, for filtration and clotting, and in the formulation of new blood vessel cells, according to Ann Junghans, also with the Lujan Center.

While the implications of the research are vast, one potential application is to help prevent circulatory blockages that occur with diabetes and other serious illnesses.

In addition to the researchers above, Mary Jo Waltman with the Lab's Bioenergy and Biome Sciences group helped prepare the endothelial cells for study. Others involved include Luka Pocivavsek of the University of Pittsburgh Medical Center and Nouredine Zebda and Konstantin Birukov of the University of Chicago. This work benefitted from the use of a neutron spectrometer at the Lujan Neutron Scattering Center that is funded by DOE Office of Basic Energy Sciences.

The research was published in the *American Journal of Physiology-Lung Cellular and Molecular Physiology* in January and published as one of scientific highlights of [MedicalXpress](#).

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